ENGINEERING LITERATURE

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EDITORIAL.

Putting a Price on the Publications of Technical Institutions.

Should technical institutions which are conducting research and investigation work make a charge for their publications, or should they furnish them free to any and all applying for them? It is sometimes claimed that such publications should be free, as the expense is paid (to a large degree) by public funds. But while it may be admitted that there should be great liberality in this direction, the publications and funds should not be wasted by distributing the former to persons who have but a very casual need or desire for them. Long experience in government and institution work has shown that great numbers of people will apply for books or publications that are free, although they have no real use for them. As editions cannot be made to meet all extravagant demands, the result is to deplete the supply so that it may become impossible later to furnish publications to those who have direct use for them. It is only within recent years that the federal government has put the distribution of its publications on a business footing, this work being now in charge of a special bureau and a small charge being made to cover (in part) the cost of production. This tends to eliminate the merely casual enquirer. The arrangement does not eliminate the free list, but reduces it to those persons or institutions who have good reason to be upon it. Somewhat the same line is to be taken by the University of Illinois in regard to the publications of its Engineering Experiment Station. The case was stated as follows by Dr. W. F. M. Goss, Dean of the College of Engineering, in a paper presented recently before the Western Society of Engineers:

> The fact that the distribution has thus far been entirely gratuitous has opened the way to minor difficulties. For example, book dealers and news agents (both in this country and abroad) frequently have calls for bulletins, the existence of which have become known to their customers through the publication of press notices. But such dealers will not handle publications which are distributed gratuitously, for with no price there can be no commission; and their customers, who might become friends of the Experiment Station, go unsupplied. Again, as the stock of a particular bulletin on the shelves of the Station approaches exhaustion, it is extremely difficult to determine who among the subsequent applicants are most worthy to become the possessors of the few remaining copies. The importance of a price applicable to all alike at this stage of the process would be of great assistance in eliminating the less worthy inquirer and would operate in the interests of the seriously disposed applicant. Influenced by such considerations as these, the Trustees have recently authorized the fixing of a price upon all bulletins of the Engineering Experiment Station. Such action is not intended to abridge the privileges of those who hitherto have regularly received these bulletins without charge, for each bulletin as issued will, as heretofore, be subject to an initial gratuitous distribution on the basis of the existing list. But in addition to this the bulletins will be placed on sale at the price stated, both in this country and abroad; and it is probable that as the supply of any issue approaches exhaustion, it will be withdrawn from the list of those which are available for free distribution. It is hoped that these provisions will operate to increase the usefulness of the Station.

We might add that dealers will not be greatly encouraged to handle this class of publications unless a discount is given to the trade. This, however, does not shake the main argument.

Over-Late Municipal Reports.

As many of our readers know full well, a considerable percentage of the various public documents compiled and issued at great expense by our National, State and Municipal governments of New York City had not yet pubdelays in publication. The Bureau of Municipal Research of New York City has recently called attention to the fact that up to the latter part of February, 1911, a number of important departments of New York City have not yet published their reports for 1909. The delinquents included the departments of Water-Supply, Gas and Electricity, Health and the presidents of the boroughs of Brooklyn and Richmond, besides a number of others. Commenting on such delays, the Bureau says:

> Reports are at best but indexes of what is going on within departments. But they are, after all, indexes and should be read by executives and public alike.
> Without information efficient government is impossible. Without reports of service rendered and work done information is impossible. Wherever inadequate, inaccurate reports are tolerated, there incompetency, misrepresentation and dishonesty will certainly thrive. Such records of service as time sheets, cost records, report cards, certificates of payroll and inspection are futile and untruthful wherever the summary of the story told by such records is neglected.

These words may well be heeded by officials of many other cities than New York.

The Contributing Editors of the Bulletin of the North Carolina Board of Health.

Not content with a single contributing editor, the Monthly Bulletin issued by the North Carolina Board of Health has the benefit of a contributing board of twenty members. These include, in the order given in the list which appears in the Bulletin, a Governor, three Honorables, two Misters, one Reverend and twelve Doctors.

According to the Bulletin itself, the object of the board of contributing editors is to bring "home to the people of the State the most fundamental problem that ever presented itself to the civic mind." Examination of the latest number of the Bulletin shows that it is also engaging the pens of other citizens interested in public-health matters besides those on its board of contributing editors. In view of the large amount of work to be done in the way of education in public-health matters, all well-directed efforts in this field are to be encouraged. When every State in the Union and every city of suitable size publishes the right sort of a public-health bulletin and succeeds in reaching the masses in that way, the battle for public health and sanitation will be all but won; or perhaps we should say well started, for contiuued discoveries open up new possibilities in public-health work on every hand and make necessary a continuous campaign of education.

A brief abstract of a recently-published lengthy report on the typhoid bacillus "carrier" is printed in "Public Health Reports" of the U. S. Public Health and Marine-Hospital Service for March 17, 1911. The abstract was prepared by R. M. Grimm, Assistant Surgeon of the Service, and is based on a lengthy paper which appeared in the supplement to the 39th annual report of the Local Government Board of England and Wales (Report of the Medical Officer 1909-10). The full report consists of 15 chapters which contain digests of many other reports, including reports from a number of experimental stations, especially in Germany, working on typhoid carrier problems. Inasmuch as the short review before us may presumably be obtained by application to the U. S. Public Health and Marine-Hospital Service, we need only give in addition to what has already been stated the following paragraph from the conclusion of Dr. Grimm's review. He says:

> Dr. Ledingham has brought together in his interesting and instructive article a great mass of material, and has presented many facts not generally known concerning typhoid fever and concerning the typhoid bacillus carrier. The article is rather long and contains so many individual reports and statistics that many details have been omitted in this review.

CORRESPONDENCE.

Uniformity and Economy in the Physical Make-Up of Engineering Literature.

Sir: Considerable discussion has recently appeared in the columns of Engineering News on the subject of engineering hand books, but there seems to be room for additional criticism of the way in which engineering literature in general is presented to its readers.

It would seem that the catalog sizes adopted by the American Society of Mechanical Engineers (3½ × 6, 6 × 9 and 9 × 12 ins.) should meet all requirements, and while most progressive manufacturers appreciate the wisdom of conforming to these standards, yet there are not a few who, through carelessness or stubbornness, persist in annoying their customers with a variety of sizes that greatly increases the difficulties of maintaining systematic catalog files.

During recent years great improvements have been made in catalogs and trade publications; many are now treatises of high technical authority and contain a great amount of useful information, but there is still room for improvement. In catalogs of machinery, for example, the subjects of efficiency, simplicity, durability, etc., are seldom skimped for space, but while many manufacturers realize the importance, to the engineer, of weights and dimensions, others give as few as possible; and many times where clearances are close, the engineer has the uncertainty of guessing, or the annoyance and delay of inquiry by letter or telegram, to obtain information that should be given in the catalog.

The great majority of engineers find it often necessary to transport from place to place all, or a part, of their libraries, and the problem of trying to pack a collection of books of all sizes and shapes into anything approaching a convenient and compact form, is likely to impress upon one's mind the undeniable fact, that, in engineering literature in general, there is a multiplicity of shapes and sizes that is both undesirable and inexcusable. This defect is so pronounced, that, in a library of fifty volumes, a variety of sizes is found embodying nearly all dimensions from 3½ × 5 ins. to 11 × 13 ins., if bound volumes of magazines are included.

The publishers of a number of hand books, such as Trautwine, Kent and Kidder, have agreed upon a size of approximately 4½ × 6¾ ins., and a great many books have the standard catalog size of 6 × 9 ins. But other publishers seem satisfied with such approximations as 5⅞ × 9¼ or 6¼ × 8¾ ins., and the writer has one book, copyrighted in 1900, that is 6⅝ × 9⅝ ins.

The variety of sizes in which engineering magazines, periodicals and reports are published affords another source of annoyance, especially to the large number of engineers who collect, from a variety of publications, such information as is available, by extracting the desired

sheets. How to file these miscellaneous sizes is by no means an easy problem.

The following partial list will serve to show the range of sizes of magazines:

	Inches.
Various engineering societies	6 × 9
Engineering Digest	7⅛ × 10
Cassier's Magazine	6⅞ × 10¼
Mines and Minerals	9 × 11¾
Mining and Scientific Press	8⅜ × 12⅝
Power	9 × 12
Electrical Word	9 × 12
Engineering and Mining Journal	9 × 12
American Machinist	9 × 12
Metallurgical and Chemical Engineering	9 × 12
Iron Age	8⅝ × 12½
Mining and Scientific Press	8⅜ × 12⅝
Engineering Record	10⅛ × 13¾
Engineering News	10⅜ × 14¼
Scientific American	11⅞ × 16

A number of magazine publishers have adopted the standard catalog size of 9 × 12 ins. and it seems there is no very good reason why the two sizes of 6 × 9 and 9 × 12 ins. should not meet all requirements. Then in filing separate sheets the 9 × 12 when folded would be uniform with the 6 × 9.

It may be argued that a reduction of the larger-sized publications to 9 × 12 ins. would not leave sufficient room for some of the drawings of large structures. But about half the required reduction could be made by reducing the margins to the size of those used in the advertising sections, leaving a height of 10½ ins. for the printed portion of the page.

Returning to the subject of books, another practice far too common is that of "padding." It is not intended to advocate that all engineering books be condensed to the same degree as some of the hand books, but most of our books might well be considerably reduced in bulk without any sacrifice of information contained or of readability. And the way a small amount of information is often expanded into a volume of large proportions is beyond all reason or justification.

A comparison will illustrate this point.

The writer has a book on machine design, 5¾ × 9 ins. × 13/16-in. thick between covers. Area of page, outside dimensions, 51.75 sq. in.; area of printed surface, 26 sq. ins. Practically only 50% of the page is used for printing, the remainder being taken up in margins. Large blank spaces are found at the beginning and ending of chapters, and illustrations of the simplest details are often made full size. For example, a drawing of the simplest design of a set collar occupies half a page. There are approximately 471 words per page (maximum) or 9.1 words per sq. in. of outside dimensions.

In contrast to this we have, in Trautwine, a page 4 × 6⅝ ins., whose area is 26.5 sq. ins.; the area of text is approximately 20.25 sq. ins., or 76.5% of the page is utilized. There are approximately 1,000 words per page or 37.7 words per sq. in. of outside dimensions. Furthermore, Trautwine has 546 leaves per inch of thickness, while the other book has only 238. Trautwine having 4.12 times as many words per sq. in. of page and 2.29 times as many pages per inch of thickness has 4.12 × 2.29 or 9.44 times as many words per cu. in. of volume as the other book. If Trautwine were expanded to the same degree as the other book, it would require 9.44 volumes the size of the present Trautwine to contain its information.

This comparison is by no means exceptional, for many other books are just as bad. For instance, a prominent authority on applied mechanics has a book in which the upper margin is 1 in., the lower 2 ins. and the sides ¾-in. each; reducing the printed area to only 48.5% of the area of the page.

The thickness of the average engineering book might easily be halved by the use of paper such as is used in Kent, Trautwine, etc.; but the use of India paper would, I think, be an undesirable extreme, as the leaves cling together and are much harder to turn separately.

Writers and publishers should not forget that, in buying technical literature, the purchaser desires information in the most condensed form consistent with clearness.

Another common defect in engineering books, especially text books, is poor indexing. Although some writers have left but little to be desired in this respect, other books are so poorly indexed that their usefulness is greatly impaired; and, if they are ever really indexed it is done through hours of tedious work by the purchaser.

Some writers seem averse to the use of illustrations; although, in many instances, no amount of text will be as expressive as a very simple drawing or sketch. This is especially obvious in connection with such subjects as mathematics, mensuration, mechanics and machine design. And still in one of the most widely-used pocket-books (Kent) these subjects are treated almost without the use of illustrations. The subject of mensuration has one figure; trigonometry one; analytical geometry one; calculus none; steam boilers none, and under machine design and strength of materials are but a poorly chosen few. This defect greatly impairs usefulness, by loss of the reader's time, as it is often necessary to make sketches before the desired formula or discussion can be applied.

That there is room for improvement in the form in which engineering literature is published, will, I think, be generally admitted. That reduction in volume, and in the variety of sizes, of such publications, to the least practicable number, is desirable, will also, I think, be conceded.

May we not hope for concerted action among writers and publishers which will lead to further improvement along these lines?

M. R. Hull.

Great Falls, Mont., March 31, 1911.

[Although we sympathize with our correspondent in substantially all his complaints and agree most heartily with some of his arguments for much needed reforms, yet we could write many columns explaining why some of the things he complains of are as they are and will for the most part will remain so. To be brief, we may say that there is more to these matters than any one not in the mysteries of publishing dreams of and that some of the arguments for standardization of sizes of technical journals have less force than might appear at first thought, especially when one considers the disadvantages which would result.—Ed.]

Mechanics of Internal Work in Elastic Bodies.

Reviewed by LEWIS E. MOORE,* Assoc. M. Am. Soc. C. E.

MECHANICS OF INTERNAL WORK (Or Work of Deformation) IN ELASTIC BODIES AND SYSTEMS IN EQUILIBRIUM, INCLUDING THE METHOD OF LEAST WORK.—By Irving P. Church, C. E., Assoc. M. Am. Soc. C. E.; Professor of Applied Mechanics and Hydraulics, College of Civil Engineering, Cornell University. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 × 9⅛ ins.; pp. 126; 43 text figures. $1.50, net.

The general subject of the mechanics of internal work in elastic bodies has been treated so sparingly in American text books and generally with such indefiniteness, so far as the conditions under which its principles may be applied are concerned, that the reader is not as a rule at all sure when or how he may safely, correctly and conveniently use its derivatives or whether such use in a particular case would shorten his labor. Several excellent articles on this subject have appeared from time to time in the technical press and the publications of the engineering societies. These articles are, however, scattered and generally are not conveniently accessible when one desires to refer to them.

This book of 124 pages has been written with the avowed intention of filling this gap in American text books by presenting the principles underlying these methods clearly and fully. At the same time the proper use, scope, and limitations of the formulae derived from these very valuable and useful principles have been clearly indicated. The principles are presented in the guise of useful tools rather than as mere abstruse mathematical curiosities. In general the proofs are followed by well-chosen problems indicating the methods of applying them.

The subject is developed by beginning in the first chapter with a very simple case of a statically determinate structure and proving the general theorem that the external work done by forces on a body is equal to the internal work done by the stresses in the bars. This theorem is then extended to cover the case of a structure having one redundant bar and then to one having a larger number of redundant bars; limiting these cases to structures in which the initial stresses in the bars are zero.

The second chapter is confined to the derivatives of internal work, first taking up the general proof of Castigliano's Theorem that the first derivative of the total internal work on a structure with respect to one of the loads equals the displacement of the point of application in the direction of the line of action of the load, and closing with the case of an external couple.

The next chapter treats of the application of the method of least work to statically indeterminate structures, taking up the general proof of the theorem and incidentally pointing out that the proof really does not depend upon the fact that the minimum amount of work be done but upon the ordinary relations of geometry and elasticity in connection with Castigliano's theorem for the displacement of joints. The latter part of this chapter is devoted to structures containing redundant bars which are originally either too short or too long, or in other words which are in a condition of initial stress and therefore cause initial stresses in the other members.

Chapter IV. takes up, from the standpoint of internal work, deflections in straight beams and curved beams of large radius; and points out by means of an example that the deflection of a beam due to shearing deformation may under certain conditions be considerably more than the negligible quantity it is generally assumed to be. In this connection it would seem that the general formula deduced for determining the deflection of beams would be more readily useful had it been carried on to the form of Fraenkel's formula, instead of leaving one of the terms expressed in the form of a differential coefficient. In this chapter the continuous girder is treated and the theorem of three moments is developed by the method of "Least Work."

The last chapter treats curved beams and composite systems, taking up for example the finding of the reactions on a continuous beam supported on three simple beams. The king and queen-post trussed beams are discussed, together with the effect of temperature on them. Knee-beams, boat-davits, and arch-ribs are also taken up and the stresses and deformations in them developed by this method.

The book as a whole bears the imprint of very careful thought in the arrangement and classification of its parts. The demonstrations are given with the characteristic clearness and brevity which have marked the author's other publications.

In this work, which is a very valuable contribution to the American literature on this subject, the practicing engineer can feel that he has a safe guide and the student a valuable short cut to a good working knowledge of these useful principles. The care taken to indicate exactly the conditions under which each formula is and is not applicable is especially commendable.

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MACHINE SHOP MECHANICS.—The Why of Things in the Shop. By Fred. H. Colvin, A. S. M. E., F. I.; Associate Editor of "American Machinist;" Author of "Machine Shop Arithmetic," etc. New York and London: McGraw-Hill Book Co. Cloth; 4½ × 7 ins.; pp. 17; 116 figures in text. $1, net.

The purpose and plan of this book are admirable. It aims to explain enough of elementary mechanics to enable the average machinist to reason correctly about the phenomena which come up in his every-day work. The book is written in a semi-conversational style, which should make it easy reading for those not accustomed to much studying. Arithmetic is the only form of mathematics employed. The explanations of the principles underlying the mechanical devices are made with frequent reference to concrete examples, well chosen both to be instructive and to make the reader more at home by associating the new ideas with things familiar to him.

In view of the general merit of the plan and execution, it is the more to be regretted that the text was not submitted before publication to some one capable of eliminating the several more or less important errors in wording, definitions, etc. Some of these errors are most surprising. For example, on page 7, in attempting to define work, the author has hopelessly confused it with power. The last three chapters, treating respectively of "Beams," "Measuring Moments" and "Force Diagrams," might better, as they stand, have been omitted. The chapter on force diagrams is particularly in need of revision, and seems to reveal considerable misunderstanding of the subject on the part of the author.

BLOCK SIGNAL AND TRAIN CONTROL BOARD.—Third Annual Report to the Interstate Commerce Commission, Nov. 22, 1910. Washington, D. C.: Pub. Doc. Paper; 6 × 9 ins.; pp. 256; illustrated.

A considerable part of the text of this report was reprinted in our issue of Jan. 19, 1911. The complete report contains some very valuable appendices. The first of these is entitled "The Principles and Mechanical Development of Train-Control Apparatus for Steam Railroad Service.

with a Chapter of Don'ts for Air-Brake Inventors." The authors of this appendix are Messrs. W. V. Turner and S. W. Dudley. The paper occupies nearly 100 pages of the report, and we have no hesitation in saying that it is the best technical treatise on the development of the air brake that we have ever seen. The authors are evidently experts of high standing in this field, and their review of the development of the air brake that has taken place during the last five or ten years to adapt it to present-day railway operating conditions is worthy of the highest recommendation. No engineer interested in any way in air-brake design should fail to obtain this monograph.

Appendix B is a paper on "The Car Wheel," by Mr. George L. Fowler. Appendix C is entitled "The Track Circuit: Some Facts Pertaining to Its Development and Use in the Automatic Control of Signals and Kindred Devices on Steam Railways." Both of these monographs are likewise worthy of commendation, and represent a grade of technical work, with intimate knowledge of practical operating conditions, which one finds too seldom in reports issued by the government.

Appendix D describes the Harrington Train Control and Alarm, and tests made upon it. This device has been used on the Erie R. R., and the Block Signal Board, while criticising some of its details, awards it substantial commendation.

A Book for Health Engineers and Health Officers.

CONSERVATION BY SANITATION.—Air and Water Supply; Disposal of Waste. Including a Laboratory Guide for Sanitary Engineers. By Ellen H. Richards. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 x 9¼ ins.; pp. 305; one folding map and text illustrations. $2.50, net.

The death of Mrs. Richards shortly after the publication of this book warrants calling this interesting and valuable work a memorial to her many years of service as Instructor in Sanitary Chemistry at the Massachusetts Institute of Technology, since the book was doubtless based on the latest revision of the author's lecture notes.

The first paragraph of the preface gives warrant to this assertion, and also reflects to some extent the wide outlook of the author:

> The experience of twenty years since the first class of sanitary engineers was graduated in 1890 has led to the compilation of these pages from the notes prepared annually for each succeeding class. The work of arousing the intelligent humanitarian is done. The economist and the sociologist are to be confirmed in their awakening interest, but *too popular* movements are to be deprecated in the beginning of any science.

As showing still further the breadth of view of the author and her high conception of the opportunities and duties of the sanitary engineer and of the superiority of the training of the engineer to that of the physician for the position of Public Health Officer, we quote two paragraphs from the author's foreword:

> The sanitary engineer has a treble duty for the next few years of civic awakening. Having the knowledge, he must be a *leader* in developing works and plants for state and municipal improvement, at the same time he is an *expert* in their employ. But he must be more; as a health officer he must be a *teacher* of the people to show them why all these things are to be. The slowness with which practicable betterments have been adopted among the rank and file is, partly at least, due to the separation of functions, of specialization, and partly to the exclusiveness of agents in the work.
>
> The individualism of the nineteenth century extended to the domain of hygiene. The physician looked after the interest of his patient, not of his patient's neighbors, and the mass of the people went their own individual way without giving him a chance until the mischief was done. The advocates of Preventive Medicine, among whom were some of the most eminent physicians, found stony fields for the seed they wished to sow. The engineer had to plow this field, lift out the stones, and prepare the ground. The application of sanitary principles used for the benefit of the people with the same energy and business sense as has been used for the profit of the individual, will soon prove that sanitation will pay as well as railroads and machine shops.

Coming now to the contents of the volume, it may be noted that, roughly speaking, two-thirds are devoted to an exposition of some of the principles governing the sanitation of air, water, and the disposal of wastes. The section on air is brief, and what is written regarding the disposal of sewage and other wastes has more particular reference to the purity of water-supplies, so that the volume as a whole is chiefly concerned with water-supplies. The last clause should not be interpreted as meaning that the book does not contain valuable information and suggestions regarding both the air-supply and sewage disposal. Of the three chapters on air, the first considers "Air a Neglected Resource;" the second deals with standards, and the third is entitled "Wholesome Air, and the Sanitary Inspector."

The portion of the book relating specifically to water-supplies opens with a chapter which outlines some of the supplies provided by the ancients, continues with descriptions of the water-supplies of Albany, Boston and Cincinnati as typical of modern supplies, and closes with a section entitled "The Indicated Future." Four other chapters go over pretty much the whole field of the sanitary character of water-supplies, methods of protection and what the author suggestively terms "The Regeneration (Renovation) of a Spoiled Watershed." Various references are made to water analyses or what the author prefers to call "water assay," including portable kits for field work. A chapter is devoted to "The Interdependence of Town and Country." After this comes a chapter on filtration. Then follow two chapters on the disposal of wastes.

The final chapter has as its sub-title "The Education and the Position of the Sanitary Engineer in the Progress of Modern Sanitation." It is appropriate to remark here, as has already been intimated, that throughout the book the sanitary engineer and engineers in general are given a high place by the author. She closes her reading text with an interesting discussion of the proper name to be given to the "new sort of engineering person" who is now playing so large a part in modern life. This discussion is sufficiently interesting to warrant reprinting, especially as the author again reverts to the greater fitness and adaptability of the engineer than the doctor to public-health work, with incidental reference to the relative failure of law and theology to keep pace with modern progress. We quote:

> *Community engineer* might serve as a term descriptive of the man who serves the whole community and considers its welfare in general.
>
> *Civic engineer* is a shorter descriptive term, and if civic is kept broadly to mean any small community, as well as a large city, is perhaps satisfactory.
>
> *Municipal engineer* has been adopted in a few places, but must be supplemented by *rural engineer* to be fully adequate.
>
> *Public-service engineer* comes nearest to giving a full explanation in the title, for the trained person is likely to come up from the employee to be the guiding force in public-service organizations.
>
> The endeavor of medicine to adapt itself to modern conditions has been more noteworthy than the efforts of either law or theology. Its high moral code of disinterested service to all has kept the ideals of medicine much more in touch with progress.
>
> Preventive medicine was an admirable watchword, public health doctor an expressive title. Nevertheless the profession has been hampered by tradition, bound by authority, and not wholly free to branch out into new fields. But to-day research in the lines of preventive medicine, the use of all scientific resources to find the reasons why, is absorbing the energies of the medical profession. All honor to it.
>
> There is, however, another element in the successful control and application of the knowledge thus gained, in the determining efficiency of health measures.
>
> The mechanical basis of modern life must come to the aid of moral and personal influence. It is not enough to tell men to do the right thing; they must be fenced in from the wrong thing.
>
> For all these reasons it would seem that the *civic* or *public-service engineer* is the emerging leader in community welfare.

Part II. (about 70 pages) consists chiefly of "One Laboratory Exercise on the Inspection of Ventilation" and "Twelve Laboratory Exercises on the Examination of Water and Wastes." Further description and any attempt to criticise this part of the book is quite unnecessary in view of the fact that the author here sets forth the methods employed at the Massachusetts Institute of Technology, which are so widely, well and favorably known. The volume closes with a very brief bibliography and a few tables for laboratory use, a folding normal chlorine map of Massachusetts and an index.

The book has one characteristic common to all we have seen of Mrs. Richard's many and forceful writings: remarkable sanity and balance on most subjects within the direct line of her own experience and knowledge and occasional surprisingly erratic and flightly observations in other fields, oftentimes with just enough reason to make these aberrations particularly likely to mislead the uninformed layman. Probably few of these flights of fancy and wanderings from fact will lead her readers permanently astray, especially as the spirit of research and verification permeates her books and will eventually guide many of her readers back into the paths of truth.

Finally we note that although the book is exasperating in places through the interjection of brief paragraphs containing undeveloped thoughts (probably suggestions for amplification in the lecture room) yet as a whole it is highly satisfactory and everywhere stimulative of thought. We do not doubt but what this memorial volume, as we termed the book at the outset, will have the wide circulation it deserves.

DEPARTMENT OF HEALTH OF THE CITY OF NEW YORK.—Monthly Bulletin, Vol. I., No. 1, January, 1911. (Eugene W. Scheffer, Secy.) New York: City Doc. Paper; 6 x 9 ins.; pp. 26.

The initial number of this bulletin contains a brief review of the health of New York City from 1868 to 1910; also a summary of the work of the Sanitary Bureau of the Department and of vital statistics of New York City, both for the year 1910. It may be added that in addition to the more formal monthly bulletin here noted, the Department is now issuing daily bulletins in typewritten form which are distributed widely to the newspaper press and others who are able to take a hand in bettering the sanitary and health conditions of the city.

ENGINEERING LAW.—Vol. I.—The Law of Contract. By Alexander Haring, C. E., LL. B., LL. M.; M. Am. Soc. C. E.; Professor of Bridge and Railway Engineering, New York University. Chicago, Ill.: The Myron C. Clark Publishing Co. Cloth; 6 x 9¼ ins.; pp. 518. $4, net.

Since from the very nature of the subject the matter contained in any new book on the law of contract, as applied to engineering, can hardly be new, the only justification for adding to the already sufficiently large number of books on the subject, must be a novel manner of treatment. This has been attempted by Prof. Haring, and with no little success, by the presentation of the law as taught in the schools of law—that is by the case system—combined with the ordinary text-book system of instruction more familiar to the engineering student. To this end certain rules of the general law of contract are set down at the beginning of each chapter, and are followed by a limited number of cited cases bearing directly upon those particular rules and finally by abstracts of related cases of special engineering application. The result should be very acceptable in the instruction of engineering students, though the adaptability for general study or reference by practitioners is doubtful, since the locating of any particular rule is somewhat difficult. From the standpoint of the non-legal man, however, this is common to most books of law.

Only the law of contracts proper is taken up in this volume, no reference to specifications being made. As it is labeled Vol. I, under a general title of "Engineering Law," it is to be supposed that the specification function of the contract will be the subject of a later volume.

A FEW NOTES ON MODERN LIGHTHOUSE PRACTICE.—By Chance Brothers & Co., Ltd., Lighthouse Engineers and Constructors, near Birmingham, England. Cloth; 5½ x 8½ ins.; pp. 87; eight folding plates and 27 text figures. 5s. per copy to those not directly connected with Lighthouse Engineering; American price, $2, net.

This book may seem to be a trade publication at first glance, but in reality it is more than that though, as might be expected, it presents the apparatus made by this firm in the most favorable light. It treats only what one might call the lighting of lighthouses—nothing being written about the construction of the houses themselves. The construction and grouping of lenses is described and pictured as built for certain varied services and the design and operation of oil-burner, gas-mantle equipment, etc., are touched upon.

THE AMERICAN ECONOMIC REVIEW.—Vol. I., No. 1, March, 1911. Bulletin of the American Economic Association, Fourth Series. (Davis R. Dewey, Managing Editor.) Cambridge, Mass.: The Association, Prof. T. N. Carver, Secy. Paper; 6½ x 9¾ ins.; pp. 219. Subscription price to non-members: $4 per year; single number, $1.

The American Economic Association was organized in 1885, and has to its credit a long

series of valuable publications in the economic field. These publications have for the most part been uniform in general make-up but have been quite diversified as to contents. Some of the publications have been in the nature of monographs, issued at irregular intervals, and others have been in the form of bulletins containing a variety of news items, book reviews, etc. We are pleased to see that the Association has now adopted what may reasonably be hoped to be a permanent plan of publication in the shape of a Review, which includes both formal papers and reviews and more or less informal notes of various kinds.

The number of the Review before us opens with an interesting paper entitled "Some Unsettled Problems of Irrigation," by Katharine Coman. This paper is a general review of the history of irrigation in the United States, more particularly from the viewpoint of governmental administration and activity. Four other papers deal with the tariff, the New York money market, trade in South America, and certain phases of immigration. A large number of reviews and titles of new books are included, together with notes on workmen's compensation bills, various personal notes, and an index to articles on economic subjects in periodical literature. The number closes with a "List of Doctoral Dissertations in Political Economy" under preparation in various American universities and colleges.

Rural Hygiene and Sanitation.

RURAL HYGIENE.—By Henry N. Ogden, C. E., Professor of Sanitary Engineering in College of Civil Engineering, Cornell University; Special Assistant Engineer, New York State Department of Health, New York: The Macmillan Co. Cloth; 5 × 7½ ins.; pp. 434; 77 illustrations in text and nine tables. $1.50 net.

Prof. Ogden set himself no easy task when he undertook to write a book covering rural hygiene and sanitation in nearly all its phases, stopping just short of advice for the treatment of diseases, on the one hand, while going into the elements of engineering design on the other. Barring somewhat numerous minor points at which the author exposes himself to criticism, the book merits almost unqualified praise, provided one overlooks or forgets the half dozen words we have italicized in this quotation from the preface:

> The following pages represent an attempt *to put before the rural population* a systematic treatment of those special subjects included in what is popularly known as Hygiene as well as those broader subjects that concern the general health of the community at large.

We do not mean to belittle either the value of the book or the intelligence of the rural population, but surely any one who has a wide acquaintance with the real problems of personal hygiene and general sanitation in country districts, and with the mass of the people which must be taught necessary reforms in both, will feel that a large portion of the contents of this book goes above the heads and far beyond the pocketbooks of any but a very small percentage of the population of rural districts. Besides, the volume makes too many incursions into controverted fields for a book designed to give first lessons in hygiene and sanitation. All this will perhaps be made clearer after we have outlined the contents of the book and pointed out some of its features to which exception may be taken.

The volume opens with some twenty-five pages on "Vital Statistics of Rural Life"—certainly not the sort of matter to put before the rural population in the opening pages of a book on rural hygiene. Next the author takes up the location of a house in its relation to soils, trees, topography, drainage and ground water. The construction of houses and barns with particular relation to healthfulness is next considered. Here information is given regarding the making and placing of concrete.

Ventilation (one chapter), water-supply and water-works construction (four chapters comprising a total of about one hundred pages) are next taken up. Then comes a chapter on "Plumbing," and then 25 pages on "Sewage Disposal." All these ten chapters, except the first one, are freely illustrated with well presented sketches of design and construction.

Milk and meat are treated in the eleventh chapter. Afterwards other foods and various beverages are taken up, the discussion here being prefaced with remarks on "The Human Mechanism" and closing with warnings against "The Drug Habit." Having already entered upon certain phases of personal hygiene, as just indicated, the author next devotes a special chapter to that subject, in which he takes up such matters as exercise, clothing, and the care of eyes and teeth.

Under the caption "Theories of Diseases," the effects of dirt, blood resistance, cell disintegration, heredity, antitoxins, immunity, etc., are considered. Next comes a chapter on disinfection and disinfectants. The various specific diseases are then considered, including tuberculosis and pneumonia, typhoid fever, and various diseases common to childhood. Under "Parasitical Diseases" malaria, yellow fever, hookworm disease, pellagra and bubonic plague are treated. For some unexplained reason the chapter entitled "Diseases Controlled by Antitoxins" opens with smallpox. Diphtheria, rabies and tetanus are then discussed.

The concluding chapter, "Hygiene and Law," takes up briefly (15 pages) a few aspects of the subject indicated, including reference to water-supply, pure-food laws, the protection of mild and quarantine.

Coming now to some of the many points where the author seems to lay himself open to criticism, particularly in view of his statement that the book is designed to enlighten the rural population of the country, we first call attention to some of the author's remarks regarding milk. After two paragraphs in which the importance of milk as food and the composition of milk are stated, the author makes this plunge, or perhaps we should say, in line with our remark as to going over the heads of the readers, takes this flight:

> In recent years, due to the advocacy of the eminent scientist, Metchnikoff, who asserts that researches in the Pasteur Institute have shown that certain diseases of advanced age are due to auto-intoxication from the larger intestine and that the consumption of fermented milk acts as an antiseptic, neutralizing this bacterial intoxication, the consumption of fermented milk, or buttermilk, or koumiss, has very largely increased. It is, in fact, rather remarkable to find that in large cities, business men whose digestions have been ruined are devoting themselves to unlimited quantities of buttermilk in the hope that their former excesses and absurdities in the way of food may be counteracted and health restored.

What, we may ask, does the rural population know about Metchnikoff, the Pasteur Institute, and auto-intoxication? We can imagine a farmer reading this paragraph and then remarking, "we feed our buttermilk to the hogs." It should be understood that thus far the readers have been given no instruction whatever on the underlying principles of hygiene and the relation of bacterial life to health and disease.

In an earlier chapter we find the author leading his rural readers into such unexplored or controversial fields as the relation of geological formation to cancer. The author confesses that nothing has been definitely proved on this point further than that statistics seem to show that cancer is more prevalent on certain geologic formations than on others. Why raise such points, which are absolutely without practical significance to the rural population, or for that matter to city dwellers, unless the author desires to mystify his readers or show his erudition?—neither of which we believe to be his object.

A notable example of how the author's treatment of the major portion of the subject is better suited to engineering or advanced agricultural students than to the rural population generally is found in the large amount of space given to plumbing and to various modern systems of sewage disposal, compared with the scant page or so which is devoted to the construction of privies. The author must know that for one house in the strictly rural districts of the country having plumbing there are 100 to 1,000, and in some sections 10,000, that have none. Even where there is some plumbing the old-fashioned privy generally holds its own, so one might expect this book to contain advice regarding the sanitary design and maintenance of privies. As a further illustration of how surprisingly impractical the author's treatment here is, we may mention the fact that he advises the use of stoves to heat privies in winter!

At a few points the author shows either ultra-conservatism or an unfamiliarity with wides[pread] current ideas and practice. He seems to ov[erlook] typhoid carriers, lays too little stress on the [dan]gers of contact infection in typhoid fever, [over]looks some of the vital points in the relati[onship] between bovine tuberculosis, the milk supply [and] human tuberculosis, and fails utterly to [pre]sent the viewpoint of a large number of our [best] sanitarians as to disinfection.

The limitations to the efficiency of chlor[ide] of lime and milk of lime as disinfectants are n[ot] set forth with sufficient clearness and emphasis. [The] remarks on both sulphur and formaldehyde as [dis]infectants are insufficient to serve as safe g[uides] for the previously uninformed; particularly [the] statement that "an ordinary heating apparat[us] of almost any sort will answer the purpose of [de]composing the solid formaldehyde." The advi[ce] to send possibly infected mattresses "to the cle[aner] to be steamed" seems inconsistent with good sanitation, for if disinfection is really needed, certainly a mattress should not be sent to an ordinary cleaning establishment. Why not send the mattress to steam sterilizers, as the author advises for clothing exposed to possible infection? But really what percentage of the rural population has either mattress cleansing establishments or steam sterilizers at its command, or would use either if it had, except under compulsion.

Under Scarlet Fever the author again takes up disinfection, or the need for it, and gives further currency to the extremest of the old-time theories of the danger of infection from clothing years after its use by a person suffering from a communicable disease. After advising that scarlet fever patients be kept well oiled to prevent infection from skin peelings (an idea abandoned by many) Prof. Ogden says:

> The writer learned recently of a family in which a child had died of scarlet fever and some of its clothing had been packed away in the attic. A younger sister grew up, married, moved away, and some twenty years after the death of the child, came back to her former home on a visit with her own little girl. The grandmother, visiting the attic, found the clothing packed away so long before, gave it to her granddaughter to wear, and in ten days the child was dead with the same disease.

If Prof. Ogden was dealing with an engineering subject he would probably pass by such a story as a mere coincidence. There is warrant in sanitary literature, as well as in good health-board practice, for giving as little weight to this story as to the one that went the rounds some years ago to the effect that typhoid fever in Rome had been traced to an excavation which exposed wastes buried some two thousand years ago. Until more is known about the cause and spread of scarlet fever perhaps the scariest of the scare stories ought to be repeated, but rural and urban populations alike have a right to know how much uncertainty surrounds some of these health-protective matters—if for no other reason than to guard against utter loss of confidence in sanitarians as knowledge progresses and old theories are overturned.

We lay considerable stress upon some of the points which we have raised because they mar what is otherwise so admirable a book, and one which seems bound to do a great deal of good. We trust that in the early revisions which seem likely to be demanded the author will remedy these defects. We also make a further suggestion in the interest of increased efficiency of the book, and that is that in future editions the order of presentation of the subjects be reversed. We may be mistaken, but the book seems to us to be wrong end to. It would seem better to present the elementary principles of hygiene and sanitation at the very beginning of the book, and not defer "Theories of Diseases" until Chapter XIV. If the book is intended primarily for engineering and advanced agricultural students instead of the people of the country side, and thus is to be used largely as a text book to be supplemented by lectures, then the order of presentation does not so much matter, although still important. We would also suggest that in the second edition a chapter be devoted to the specific subject of public-health service for rural districts, and that at least a brief descriptive or weighted bibliography be added.

Finally, we note that the only other book at all comparable with this one, so far as we remember, is one of exactly the same title by Dr. Isaac W

Brewer, which we reviewed in this Supplement for March 17, 1910. Dr. Brewer's book was less extensive in scope than is Prof. Ogden's, and naturally went little, if at all, into the sanitary engineering aspects of the subject. As far as it did go, it was for the most part highly commendable and might well be studied in conjunction with the present volume.

Bacteriological and Enzyme Chemistry.

Reviewed by C.-E. A. WINSLOW.*

AN INTRODUCTION TO BACTERIOLOGICAL AND ENZYME CHEMISTRY.—By Gilbert J. Fowler, D. Sc., F. I. C., Lecturer in Bacteriological Chemistry in the Public Health Department, Victoria University of Manchester; Examiner in Biological Chemistry to the Institute of Chemistry of Great Britain and Ireland. New York: Longmans, Green & Co. London: Edward Arnold. Cloth; 5 × 7½ ins.; pp. 328; four plates and 28 text illustrations. $2.10, net.

Dr. Fowler is well known to all engineers concerned with sewage problems for his exhaustive investigations of contact treatment at Manchester and for his manual on Sewage Works Analyses. The present work is not concerned, like his earlier volume, with the detail of analytical procedure but deals with the more fundamental problems of biological chemistry and is intended primarily as a preparation for the examinations conducted by the Institute of Chemistry.

The first portion of the book includes the more general and theoretical aspects of the subject. A necessarily very inadequate chapter of 19 pages on bacteriological technic is followed by a brief but excellent account of some of the fundamental conceptions of organic chemistry, good chapters on the essential chemistry of the proteids and carbohydrates and a discussion of the more important enzymes and their action. The treatment of the enzymes, excepting amylase and zymase, is not very full but the chapters on the sugars and on the decomposition products of proteids are well condensed and give in compact form just the information that the bacteriologist or the engineer, who is not actively concerned with organic chemistry, needs when he wants to refresh his mind upon these subjects.

The later chapters deal with the more practical results of the application of biological processes in connection with the cycle of nitrogen and of sulphur, with industrial fermentations, with the bacteriology of the soil and with the chemistry of sewage purification. The treatment of nitrification is excellent while the fixation of nitrogen receives rather scant attention. Dr. Fowler's account of the fermentation processes utilized in the preparation of indigo, tea, cocoa, coffee and tobacco is particularly valuable and contains much practical information, not accessible elsewhere, so far as the reviewer is aware. Soil chemistry and, of course, sewage chemistry, are well handled.

On the whole the book is well proportioned and accurate. It contains a large amount of carefully condensed material and is brought well up to date, including, for example, much of the most recent work on the alcoholic fermentation, on the synthetic action of chlorophyll and on the bacteriology of the soil. It suffers inevitably from the attempt to cover so large a field and to digest complex phenomena into elementary form. The reviewer cannot feel that much profit would be derived from this book by those unfamiliar with organic chemistry and bacteriology (for whom it appears in part to be designed); to those who have studied these subjects, but have become rusty in them, and have not followed recent developments in biological chemistry, it will prove a valuable reference book.

English Arc Lamps.

THE APPLICATION OF ARC LAMPS TO PRACTICAL PURPOSES.—A Manual for Arc Lamp Users. By Justus Eck, M. A., M. I. E. E., London: S. Rentell & Co., Ltd., (36 Maiden Lane, Strand). Cloth; 5⅛ × 8¼ ins.; pp. 101; 92 illustrations in text and 12 tables. 2s. 6d., net; American price, $1, net.

This volume may have a distinct field of usefulness in England, but it will be of little service to American readers, except perhaps those who have occasion to refer to descriptions of what the author calls typical (English) arc lamps. Two-thirds of the book is given over to such descriptions and one-third to a few very general chapters on the arc lamp and its uses.

The author's aim is expressed in no uncertain terms:

> The sun, the prototype of cheap and powerful illuminating sources, differs from the arc lamp in that it has a fixed orbit, and that the illuminated object or space must adapt itself to this condition, whereas the arc lamp can be fixed when desired.
>
> To meet the solar conditions, houses are built with such maximum of window space as artistic effective structural possibilities and the nature of the work carried on in the interior dictates. Rarely, indeed, except in factories with the so-called shed or saw top roof, is there an even distribution of light, in fact, the increasing value of sites, the possibility of constructing and utilizing tall buildings, all tend to make day lighting less satisfactory.
>
> With artificial lights, especially electric lights, conditions are different.

After a short chapter of such encouraging remarks comes one on "light radiation" in which the distribution of candle-power in various directions from different arcs is described. The effect of such distribution on the illumination of surfaces under the lamp is stated, with the help of rectangular diagrams. A few general figures on minimum lighting requirements for various commercial services are given with tables showing the amount of illumination which can be secured on various areas with various currents and lamp arrangements. It is surprising to note that the author uses units based on Hefner (German standard lamp) candle power.

There is also a chapter comparing the efficiency of various electric illuminants and another chapter compares the color values. In the former, the author warns against loose statements of candle power but bases his own comparisons on a table showing the specific energy consumption of widely different sizes of different types of lamps for which the actual candle power determinations are variously "mean spherical," "mean hemispherical," and "vertically downward," and therefore are not comparable.

In the description of different types of arc lamps, much space is given to the flaming arcs, using impregnated carbons, but no mention is made of the very important (at least in America) "luminous" arc using one movable electrode of titanium oxide and magnetite and the other a stationary and permanent electrode of copper.

A Veteran Engineer-Soldier on Stopping War.

WAR OR PEACE—A Present Duty and a Future Hope. By Hiram M. Chittenden, Brigadier-General, U. S. A., Retired; Author of "The American Fur Trade of the Far West," "Yellowstone National Park, Historical and Descriptive," Etc. Chicago, Ill.: A. C. McClurg & Co. Cloth; 5⅛ × 8⅛ ins.; pp. 273. $1, net.

Gen. Chittenden has presented, in brief compass and readable form, a strong argument for lessening the enormous war tax upon the civilized nations of the world. He first examines some of the arguments for war and militarism in general, under the general title "Mistaken Sanctions of War." He then presents the other side of the case under the heading "Condemnation of War," writing here of the moral damages which result, as well as of the destruction of life and wealth and the general economic waste of war. His next remarks are grouped under the general heading "Armed Peace," after which he considers progress toward permanent peace and gives supporting arguments. The concluding chapters are entitled "The Present Duty" and "The Future Hope." Here the author holds individual disarmament to be impracticable, takes up various phases of his general subject in relation to the United States and finally proposes a scheme for a world federation with a permanent government formed in some respects after the model of the Government of the United States. This plan of a world federation he thinks is more likely of success than the more common plan of arbitration as occasion may arise.

It may be added, as a matter of interest to such of our readers as are not already aware of the fact, that Gen. Chittenden is a graduate of West Point and was Chief Engineer of the Fourth Army Corps during the Spanish-American War; also that he has performed important services in what might be termed semi-civil life in connection with the Engineer Corps of the U. S. Army. From sources entirely outside the book or the author himself, we are informed that Gen. Chittenden, after a long period of public service in the field, is devoting the remaining years of his life to the formulation and the publication of some of the ideas on great public questions of the day which developed in his mind during an active career which did not always afford leisure for writing. His notable contribution to the American Society of Civil Engineers on the vexed subject of the relation of forests to stream flow, as well as his communications to this journal on that subject, will be remembered by many of our readers. His present volume is quite as notable as an earnest attempt on the part of a thoughtful tempt on the part of a competent and thoughtful observer to present the truth regarding a problem of world-wide importance and one which vitally affects the future progress of human society.

PONTS EN MACONNERIE.—(Calculs et Construction). By M. A. Auric, Ingenieur en Chef des Ponts et Chaussées, Ingénieur en Chef de la Ville de Constantinople; with Préface by M. J. Résal, Inspector Général des Ponts et Chaussées, Professeur a l'Ecole des Ponts et Chaussées. Paris: Octave Doin & Sons (8, Place de L'Odéon). Cloth; 4 × 7¾ ins.; pp. 315; 109 figures in text. 5 francs; American price, $1.00, net.

The author of this book does not claim to have prepared an exhaustive treatise on the subject of masonry arch bridges but rather a résumé of the subject, suitable for the style of the "scientific encyclopedia" of which it forms a part. It is in three parts; first, a very complete and interesting study of the historical development of the masonry arch in bridge construction; second, an "analytical section" on the design of masonry arches, and third, a "synthetic section" on their construction. The treatment throughout is less theoretical and mathematical than most French scientific books, which should commend it to those American engineers who have a reading knowledge of the French language.

THE MANUFACTURE OF ROOFING TILES.—By Wolsey Garnet Worcester; Edward Orton, Jr., Collaborator and Editor. Columbus, Ohio: Pub. Doc., Bulletin No. 11, Geological Survey of Ohio; J. A. Bownocker, State Geologist. Cloth; 6⅛ × 9¾ ins.; pp. 476; one folding plate and 186 illustrations in text.

It is the intention of the Geological Survey of Ohio to take up in the immediate future a series of reports upon the technological side of the manufacture of clay products in distinction to the usual reports on the occurrence and extent of the clay beds of the state, which have been fully covered in past reports. The volume before us is the first of these intended publications. It is stated that it is published first, not because of its primary importance among the clay industries, but because it was the first to be completed. It is a remarkably complete treatise on the subject of clay tile manufacture, not particularly as practiced in Ohio, but in the past and in the present in all places. For the rather limited field it aims to cover, it is a very valuable text.

OTTAWA RIVER STORAGE.—Progress Report, Fiscal Year 1909-10; Department of Public Works, Ottawa. (Supplementing investigations in regard to Georgian Bay Ship Canal Project.) Ottawa, Canada: Pub. Doc. Paper; 6¾ × 10 ins.; pp. 348; 23 maps and diagrams, 64 photographic views and 526 tables.

This report consists mainly of 252 pages of tables of the elevations of the Ottawa River at various points in the year 1909. The river is being carefully gaged and studied with the idea of completely controlling its flow for the improvement of navigation, water supplies and water powers. Surveys have been made to obtain more definite information of the various tributaries, and permanent marks indicating high-water level at the head and foot of the different falls and rapids have been established and located.

Several pages are devoted to the progress of

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construction work on the Timiskaming Dam and reservoir, the excavation of the Ontario channel, and the Kipawa Dam construction. Numerous photo reproductions are included which give an excellent idea of the character of the country. Besides these two dams a third is under contract and several more are ultimately planned.

British Government by Experts, Politicians and Lords.

PEERS AND BUREAUCRATS.—Two Problems of English Government. By Ramsay Muir, Professor of Modern History, University of Liverpool. London: Constable & Co., Ltd. Cloth; 5 x 7¾ ins.; pp. 243. 4s. 6d., net; American price, $1.80.

While this volume relates wholly to problems of British government, it is full of interest and suggestion to Americans. This remark applies particularly to the section on bureaucracy, which occupies nearly half of the book. The author's definition of bureaucracy is:

> Bureaucracy means the exercise of power by professional administrators, by trained and salaried experts. It has never existed, and will probably never exist, by itself; but it can thrive equally well under any form of government, monarchic, aristocratic or democratic. In some degree, of course, it is essential to the working of all governments. But the degree of independent authority which the bureaucrats or salaried experts wield will obviously vary in proportion to the variety and complexity of the functions undertaken by government. Where (as in eighteenth-century England) neither the national nor the local government performs any but the most limited functions, there will be little room for the professional administrator, and he can be kept in a humble and subordinate place. * * * But during the nineteenth century the sphere of government has been rapidly enlarged in all directions and in all countries. The old functions have marvellously increased in range and complexity; and new functions have been undertaken which dwarf the old.

On the face of it, one might suppose that nothing better could be asked for than government by trained experts. But that is not the point. The author believes in experts and wants to see their employment extended upwards from the subordinate to the leading positions in the executive branches of the government.

As many of our readers know, the two-party system of government prevails in the extreme in Great Britain, and when the dominant party loses control of the House of Commons the Ministry is held to have been repudiated, Parliament is dissolved and a new election follows. The result is that the members of the Ministry forming the heads of the various executive branches of the general government are likely to be swept out of office at any time. But, quite contrary to our American system of government, the subordinate executive officials remain in office virtually for life, quite regardless of the frequency of party changes. The various members of the Ministry have comparatively little control of their departments, although they, and not the bureau heads, are held strictly responsible for them. This leads to an anomalous condition, a remedy for which is sought by the author of the book before us, but with no further success than the presentation of an argument for the devising of some scheme by which the business and intellectual ability of the two Houses of Parliament may be utilized in the details of the executive departments, instead of lying almost idle while the members engage in the struggle for party control of the legislative machinery—a struggle in which most of the participants merely dance to the "whip" of the party to which they have given allegiance.

It never seems to occur to the author to consider the possibility of a more complete separation of legislative and executive functions than exists in England, leaving the Parliament and the Ministry free to deal with legislative matters and financial policy alone and entrusting administration, or the executive branch of the government, to departments entirely separate. Of course, such an idea would be considered revolutionary, but, although it might create new difficulties, it would lessen the anomalous character of the present system of government.

It would be unfair to the author not to make clear that he discusses numerous evils incident to bureaucracy other than the one great evil just indicated. Some of these he graphically pictures as the "Sin of Red Tape," the "Sin of Mystery-mongering," the "Sin of the Jack-in-Office," and the "Sin of Gentlemanly Malingering." This characterization helps to explain why the author should devote nearly one hundred pages to a discussion of bureaucracy, though virtually defining it as government by experts.

Of the second part of the book, which deals with the reform of the House of Lords, we need only say that after discussing the subject at some length and considering various possibilities in considerable detail, the author presents a plan for a relatively small Upper House to be chosen by public election by practically the same elective franchise as selects members for the House of Commons, but by an altogether different plan of representation of electoral districts and a somewhat radical method of election. In short, while firmly of the opinion that the two-party system must be continued in the House of Commons, he believes that it is highly desirable that in the Upper House representation should be given to various parties and shades of opinion. He therefore favors a preferential system of voting, under which each voter would express his first, second, third, etc., choice. The benefit of the plan, as claimed by the author, is that, besides giving representation to perhaps a half dozen different parties, somewhat in proportion to their relative strengths, the large election districts which would result from the small membership of the Upper House would tend to the selection of prominent and capable men as candidates, since men little known and of little ability would stand small chance of election in large districts. In addition, the author is of the opinion that those voters who had little competence to judge of the relative merits of different candidates would not carry the preference-voting system far, which would tend to make the real electorate of the Upper House the more intelligent part of the voting population.

The full force of the author's argument on the many points which he brings out in support of his plans cannot, of course, be fully grasped by those who do not realize the immense difference between government in England and in this country. Some of these differences would become apparent, on reading the book, even to those having little previous knowledge of English government.

The book, as a whole, is interesting, but particularly the section on bureaucracy, and is well worthy of the attention of a large number of American readers. We should perhaps add that, although the author discusses bureaucracy with more particular relation to the national government, he makes a number of interesting and pertinent references to local government. Some of these give high praise to engineers and other technically-trained men in the municipal service.

CURRENT RAILWAY PROBLEMS.—By Samuel O. Dunn, Editorial Director, "Railway Age Gazette." New York: Railway Age Gazette. Paper; 5 x 6½ ins.; pp. 85. 25 cts., net.

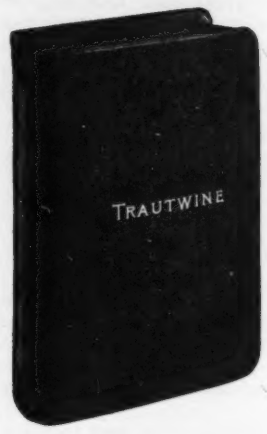
The author of this book is the Western Editorial Manager of the "Railway Age Gazette." A portion of the articles were contributed to that journal and others were published in the "Journal of Political Economy." The author's position on the subject discussed appears to be generally what may be called the railway position. However, the author has made a thorough enough study of economics to enable him to take a much broader view than a railway manager of twenty or even ten years ago was apt to do. Thus, while his discussion is on the whole against the limitation of railway profits in his chapter devoted to that subject, he yet admits that "some consideration ought and must be given to the profits of railways in determining what rates they should be allowed to charge."

INVENTORS AND INVENTIONS.—By Henry Robinson. New York; The Author. Paper; 7 x 10 ins.; pp. 95; illustrated. Price, 25 cts.

This is a rather pessimistic essay on the hard career of the inventor. Its main object seems to be to discourage the inventive enthusiasm. Pictures of a score of famous inventors and one unknown modern inventor are included. For the rest, the text is interspersed with many gaudy cartoons awkwardly executed, which succeed in making the entire pamphlet ridiculous.

TRAUTWINE'S

CIVIL ENGINEER'S POCKET-BOOK



19th edition, 100th thousand, 1909
300 pages of new matter.

More than half re-written for the last two editions. Of the remainder, about half consists of tabular and other matter of permanent value.

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Scientific Management.

THE PRINCIPLES OF INDUSTRIAL MANAGEMENT.—By John C. Duncan, M. S., Ph. D.; Assistant Professor of Accountancy, University of Illinois. New York and London: D. Appleton & Co. Cloth; 5 × 7¾ ins.; pp. 323; 60 text illustrations. $2, net.

The field which this book covers, or attempts to cover, is so large that a descriptive summary is not easily formulated. Probably every one who has to do with getting a manufacturing enterprise started or with directing an existing enterprise will be able to find some new facts, some suggestive views or stimulating arguments in Mr. Duncan's text. Whether the book is what the author aimed at, namely, "a scientific treatment of industrial management," is somewhat doubtful, however. It would appear that the book is meant primarily as a college student's text-book; remembering this, the characterization as "a scientific treatment of management" may perhaps justify itself, on the theory that any piece of writing which is intended and used as a student's manual represents science.

The book is in three sections, of which the first deals with the strategic question of plant location and the quite speculative matters of business concentration and industrial specialization. This first section is put under the title "The Economic Environment." In the second section attention is directed to the technology of industry; that is to say, to the requirements imposed by the nature of the business, the need for arranging the plant to suit the work, the need for a suitable building and the need for providing operative power. The first chapters of the section, however, are again speculative, containing general considerations on "continuous industries" and "assembling industries." Presumably these chapters have the purpose of impressing upon the reader the fact that a plant must be arranged and constructed to suit the work it is to do. In the third section, under the title "Organization and Management," there are three main subjects: (1) Distribution of authority and responsibility; (2) labor and the training and payment of labor; and (3) shop records, i. e., shop accounting details.

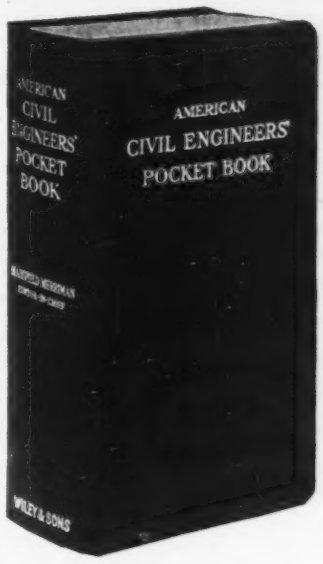
The most important service which a book of this kind can render is to put before the multitude of persons occupying managerial or directing positions throughout our industrial and commercial life a sketch, even if only a fragmentary one, of the manysidedness of the problems which should engage the manager's attention.

SCIENTIFIC MANAGEMENT AND RAILROADS.—Being Part of a Brief Submitted to the Interstate Commerce Commission. By Louis D. Brandeis. New York: The Engineering Magazine. Cloth; 6½ × 9½ ins.; pp. 92. $1, net.

Mr. C. B. Going says in the preface that this book reproduces that part of Mr. Brandeis' brief to the Interstate Commerce Commission in the recent railway rate cases which covers the principles and results of scientific management; and he says that it is offered "in a spirit of constructive effort and in dedication to a public service." The text which follows this preface consists of many extracts from the testimony given at the hearings in the rate cases, and from books, etc., introduced and joined up by large-type paragraphs from Mr. Brandeis' pen, these being of argumentative or persuasive trend. If the book has any distinct mission, we suppose it to be that of setting forth clearly what "scientific management" is. If this is its mission, however, it fails lamentably as far as the reviewer is concerned. While the testimony contains much enthusiastic language and several descriptions of elaborate "planning departments" organized according to the ideas originated by Mr. F. W. Taylor, there is no full definition of scientific management that could be understood by an ordinary mind. The book will, however, always retain much interest as a historical document.

ASSOCIATION FOR STANDARDIZING PAVING SPECIFICATIONS (Formerly Organization of City Officials for Standardizing Paving Specifications).—Proceedings of the Annual Meeting Held at New York City, Jan. 10-14, 1911. Chicago, Ill.: John B. Hittell, Secy.-Treas., 5917 Winthrop Ave. Cloth; 6 × 9½ ins.; pp. 127; one folding plate and one illustration in text. $5 to non-members.

The Proceedings of this association consist almost wholly of committee reports on standard



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specifications for various classes of pavements, accompanied by more or less discussion by the full membership. The present volume contains specifications for asphalt, bituminous concrete, cement, concrete and concrete pavements, creosoted wood blocks (including analysis of coal tar creosote), macadam, stone block (the latter presented too late for action), and vitrified brick.

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Engineering Index.

THE ENGINEERING INDEX ANNUAL FOR 1910.—Compiled from the Engineering Index Published Monthly in "The Engineering Magazine" During 1910. New York and London: The Engineering Magazine. Cloth; 6½ × 9½ ins.; pp. 496. $2, net.

Beginning in 1906 "The Engineering Magazine" started compiling its monthly classified index of current engineering literature as an annual publication, instead of the five and ten-year compilations that had appeared theretofore. This has the twofold advantage of early and economical publication, but it has the very great disadvantage of the separation of current matter, for the literature of four or five years ago is still current, into five or more different volumes, each one of which must be consulted for most uses of the index. The editors claim that one of the most desirable functions of the index is to serve the busy man who wants to glance over the very recent literature of his own particular field, in which case the early publication after the end of the calendar year does certainly make available a summary of that literature, when it is still fairly fresh from the presses. Whether that makes up for the obvious labor of searching through five separate indexes for an article of unknown date is a question. It should be noted, however, that prior to the adoption of the yearly volume plan one had to consult the monthly indexes, which run up to 60 between volumes, so perhaps complaint should be turned into thanksgiving. A desirable thing would be to consolidate the yearly volume in a five-year volume, and the ideal plan would be one grand consolidated index covering the period since the Johnson or Association of Engineering Societies was begun in 1884.

The method of arrangement of articles is the same as has been followed for all of the annual volumes. In the words of the preface

> the articles indexed are first grouped under the great divisions of engineering practice to which they belong—Civil, Mechanical, Electrical, Mining, etc.—and under these again they are sub-grouped according to the recognized special divisions of each field. After these two steps have been taken in sorting the miscellaneous literature of the day into closely related sections, the final arrangement under each section becomes strictly alphabetical.

So far as we can make out, the main beneficiaries of this plan are the indexers whose task of compilation from the monthly indexes is thus greatly simplified and the same busy man noted above, who, to paraphrase the preface, is thereby saved "plodding through all the index alphabetically, looking up every possible word which might title an article of importance to him." The trouble with this system of indexing lies in the assumption that there are "recognized special divisions of each field" which may be so clearly distinguished that the reader will generally follow the indexer's mind. In so far as the larger divisions of engineering go this rule may be safe. It is not unlikely that the reader can determine whether the subject for which he is looking will be under civil or mechanical engineering, but it is not so likely that he will be able to locate under what precise sub-head the indexer has chosen to put it. For instance, we find "wage systems" as a subhead under "construction," which in turn is under "Civil Engineering" and "Stone Crushing" under "Municipal," which is also under "Civil Engineering." To be sure, the way is cleared partly by the prefatory index of subheadings, but the two examples will indicate the difficulty in correctly assigning subheads under the main subjects. Our experience, both in the compilation and in the use of indexes, has been that the general alphabetical subject heading offers less complication to both maker and user.

The main result of the plan as applied to the "Engineering Index" is the wide separation of articles of the same nature. In some cases the original in one language and its translation in another are under entirely different headings; in other cases the same article in two different papers are on different pages. To refer to but one of these instances—which we remark because of its personal interest—an article in Engineering News on the first set of tests on the Medina Aqueduct model arches by the New York State Barge Canal engineers, is indexed under Civil Engineering—Bridges—Architecture, while another article appearing in the same journal, four months later, on the second series of the same tests, is to be found 64 pages away under Civil Engineering—Water Supply—Aqueducts.

Only those who have attempted the compiling of an index realize the difficulties involved. The individual reader whose sense of order or assignment runs counter to that of the indexer is bound to complain solely on the basis of one item which seems to him misplaced. It is the duty of the indexer to attempt an average which will meet the minds of most of those who consult his index. To state whether or not that average has been accomplished in any particular index is beyond the capacity of any one reviewer. In this case, however, it is our opinion that the "Engineering Index" would serve its users more efficiently had it not so many subheads; that is, if a general subject heading system (not a title system) were followed.

Commission Plan City Charters.

LOOSE-LEAF DIGEST OF SHORT BALLOT CHARTERS.—A Documentary History of the Commission Form of Municipal Government. Edited by Charles A. Beard, Ph. D., Associate Professor of Politics, Columbia University. New York: The Short Ballot Organization, 383 Fourth Ave. Cloth covers, loose-leaf plan; 9½ × 11½ ins. $5, net.

The commission plan of city government has been making such headway of late as to render it difficult for any one not possessed of extraordinary facilities for collecting and digesting information to keep track of its progress. There seems to be no question but what the plan will become even more popular in the future than in the past, with a corresponding increase in the demand for authoritative information regarding it. The editor and publisher of this book have rendered a public service for which they deserve commendation, and it is to be hoped that the appreciation of this service will take such a practical form as to make it financially possible to keep the book up to date by means of the loose-leaf system which has been adopted.

The actual digest of charters is preceded by a few well-selected papers and addresses on the commission plan or closely related topics. These are all reprints, but are none the less valuable for those who do not already have them at hand in convenient form. There is then given a composite view of the short ballot or commission plan charters as a whole. This is followed by a brief digest, in accordance with a uniform scheme, of each of the charters which satisfies the ideals of the short-ballot advocates. Where, instead of a charter for each city, the state has passed a general act applicable to all cities or to cities of a certain class, a digest of this act is given. The digests just mentioned are followed by tabular statements in which there is given, by cities arranged in population groups, the following information; population, form and date of charter or general state law, date charter went into operation, number, salary and length of term of commissioners, and salary and term of office of the mayor. Another set of tables summarizes charter provisions regarding the initiative, the referendum, and the recall.

Following the tables a number of charters and general statutes are given in full. Then come recent reports from special correspondents regarding the working of these charters in a number of representative cities. A bibliography is included.

The publication as a whole deserves hearty commendation as a well-planned and well-executed piece of work which, if kept up to date as proposed through the loose-leaf system, will be of increasing value as a compendium of information on a vital subject.

We cannot refrain from mild criticism of both the editor and publisher for what looks like an attempt to float short-ballot propaganda on the great popular wave of enthusiasm for the commission plan of city government. It may be, as the editor urges, that the term "commission charter" is a misnomer but both the term and the sort of charter it represents came into use before the "short ballot" or the Short Ballot Organization were heard of. Moreover, the short ballot, like the small commission, is only one of a half dozen distinctive features of what has come to be universally known as the commission plan, and the other features are essential parts to the success of the commission plan, while they are not essential to the short ballot. As bearing on the last assertion it may be noted that Mr. Richard S. Childs, Secretary of the Short Ballot Organization, in a paper printed in the volume under review, seriously questions the applicability of the commission plan to large cities, although he is devoting his energies to short-ballot propaganda for cities large and small, and for state elections as well. Other advocates of the short ballot go even further than Mr. Childs in questioning the wisdom of adopting the commission plan. All this, however, detracts but little from the value of this loose-leaf digest of commission plan charters.

The Elements of Dynamic Flight.

THE AEROPLANE.—An Elementary Text-Book of the Principles of Dynamic Flight. By T. O'B. Hubbard, Secy. Aeronautical Society of Great Britain, Joint Editor "Aeronautical Journal;" J. H. Ledeboer, B.A., Scholar, Caius College, Cambridge; Editor "Aeronautics," Joint Editor "Aeronautical Journal," and C. C. Turner, Author of "Aerial Navigation of To-day," Cantor Lecturer on Aeronautics, 1909. New York and London: Longmans, Green & Co. Cloth; 5¼ × 8 ins.; pp. 127; four plates and 35 illustrations in text; six tables. 2s. 6d. net; American price, $1 net.

This little book should be easy and interesting reading to any engineer who is interested in the phenomena back of dynamic aerial flight, or to any one similarly interested who has a working knowledge of mechanics and elementary physics.

The authors have made a logical development of the theory of design of aeroplane flyers generally. They have also made one of the simplest treatises we have seen as they have passed over the complicated discussions of mooted points with a statement of observed facts and their bearing to the subject in hand without taking space for conflicting analyses of the phenomena.

There is first a brief preliminary summary of knowledge of the physical properties of air. This is followed by statements of resistance offered by air to the passage of a body through it. The term "resistance" is thereafter used to indicate the force exerted on a body having motion relative to air. A formula for pressure per unit area for a surface subjected to steady air currents is developed, in part logically and in part empirically ($R = K\ S\ V^2\ \lambda \sin \alpha$: where R = Kg. per sq. cm.; K = empirical coefficient of resistance dependent on density of air; V = velocity of motion through air; λ = empirical coefficient depending on ratio of breadth to length of plane; α = angle of inclination to path of air current).

From this point the authors proceed to resolve the air pressure into "lift" and "drift" components and they show how the "lift" balances the dead weight of a machine and how the "drift" represents the propulsive force necessary to drive the aeroplane forward.

This sort of discussion is carried through for strict planes and later the application of the laws and formulas (with revised coefficients) is stated for the familiar curved supporting surfaces of aeroplane flyers. The applicability of the plane expressions to curved surfaces is stated as an experimentally determined fact. The fierce contentions that have waged over the explanations of the increased lifting power of curved wings over planes have no place here to confuse the student.

Following this appears matter on the more important details of aeroplane design, broadly considered—stability, equilibrium systems of control, starting, turning, gliding, etc. A chapter after these takes up the application of mechanical power for propulsion, loss of power in transmi-

sion and in the propeller, design of propellers, etc. The rest of the book is filled with miscellaneous but pertinent matters, such as descriptions of pertinent types of flyers, brief outlines of the theory of steam and internal-combustion engines, problems of navigation.

Bearing in mind the limitations of simple treatment which the authors have imposed on themselves, few criticisms can be made. Perhaps the most notable point which obtrudes on an engineering reader is the statement, on page 55:

> An aeroplane cannot go faster than a certain speed; when that speed is reached any excess of power will serve only to lift it out of its path and will not cause it to go any faster.

The experience of the authors leads us to suppose that they would not say what most persons would read into this sentence. We may charitably assume that they have not clearly developed some idea in mind here, for, in the view of the earlier statements (1) that forward velocity increases with the square root of propelling force and (2) that lifting force increases with the square of velocity, it is evident that some qualification of the above quotation is needed.

The authors describe the "Antoinette," "Demoiselle" and "Bleriot" monoplanes and the "Curtiss" and "Farman" biplanes, but fail to show the important "Wright" flyers. Indeed there is scant reference to the work of these pioneers. Also the treatment of steam and gasoline engines is not the best that could have been given in the same space, though these are minor matters.

UEBER MEHRFACHE ELASTISCHE GEWOELBE.—Eine Theoretische Untersuchung über die Statische Wirkungsweise der Uebermauerung bei Weitgespannten Gewölben, Ein Beitrag zur Theorie der Nebenspannungen Gewölbter Brücken. By Wilhelm Schachenmeier, Karlsruhe. Leipzig: Wilhelm Engelmann. Paper; 7¼ × 11 ins.; pp. 84; 43 illustrations in text. 3 marks; American price, $1.20, net.

The popular type of arch bridge in which secondary arches footing on the main arch carry the roadway is always analyzed by regarding the piers of the secondary arches as simply supported on the main arch. The author of this monograph, however, chooses to consider such a structure as a continuous elastic system, wherein the loads transmitted from secondary arches to main arch are variable and statically indeterminate. Therefore he worked out a great maze of formulas and coefficients by means of which the numerical solution is to be made in any given case.

THE LIFE OF JOHN ERICSSON.—By William Conant Church, Editor of the "Army and Navy Journal." Two volumes in one. New York: Charles Scribner's Sons. Cloth; 5½ × 8¼ ins.; pp. 357; 53 illustrations in text. $1.50, net.

This life of one of the greatest engineers the world has ever produced (see editorial appreciation, Eng. News, March 16, 1889) appeared in two-volume form in 1890, a year or so after Ericsson's death. The author was chosen by Ericsson himself, and had at his disposal a large mass of letters and papers, besides the benefit of information from office associates of the great engineer. The present edition appears to have been printed from the original plates and thus to differ from the original only in its single-volume form and greatly reduced price ($6 to $1.50, net). In its present form the biography is satisfactory in its make up and better suited to the library as well as the purse of most engineers than was the two-volume original.

PONTS SUSPENDUS.—By G. Leinekugel le Cocq, Ancien Ingenieur Hydrographe de la Marine, Ingenieur en Chef des Etablissements F. Arnodin. In two volumes. Vol. I.: Ponts Suspendus Flexibles et Semi-Rigides; Vol. II.: Ponts Suspendus Rigides. Paris: Octave Doin & Sons. Cloth; 5 × 7¼ ins.; pp. 720; 159 figures in text. 10 francs; American price, $3, net.

This is a fairly complete, though hardly novel, treatise on the design of suspension bridges, the first volume devoted to the flexible and semi-rigid type, the latter with stiffening trusses, and the second to the rigid type consisting fundamentally of two beams hung from pins at the piers and joined by a pin at the center. It is throughout a theoretical discussion with very small attention to structural details. The author seems very rabid against American bridge engineers, particularly

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American designers, who, he frequently asserts, are ignorant of the principles of mathematics and mechanics and whose bridges, apparently, stand up merely on account of superior construction, or an overweight of metal. He also states that a Frenchman has been called in to redesign the Quebec bridge. If this is so, the gentleman must have assumed the name of one of three or four well-known American and Canadian engineers.

Chemistry of Coal Mining.

ELEMENTARY CHEMISTRY FOR COAL-MINING STUDENTS.—By L. T. O'Shea, M. Sc. (Sheffield), B. Sc. (London); Professor of Applied Chemistry in the University of Sheffield. New York and London: Longmans, Green & Co. Cloth; 5¼ × 8 ins.; pp. 319; 106 illustrations in text; five appendixes. $1.80, net.

In his preface the author states that as a result of his experience in lecturing to various classes of coal mine workers he has found that there are many students who have little or no knowledge of chemistry, but who are desirous of learning something of the subject for daily application. He has found that the ordinary text-books fail to satisfy the demand of this particular class of students, since they contain unnecessary material and omit certain desirable discussions. The author also states that the present work has been prepared to meet the wants of such men solely and that it does not pretend to be a complete text-book of chemistry.

Careful reading of the book raises the question whom the author here considers a "student." If by this he means the ambitious miner, it would seem that the preliminary education of such a man, up to the time this book was placed in his hands, would hardly be sufficient to enable him to plunge into the necessary discussions of chemical and physical laws which have to be stated at the outset. If the term "student" means the younger mine workers who eventually intend to become inspectors or minor officials, we may expect that they would be better able to assimilate the text. The almost fragmentary character of the work from the standpoint of general chemistry would seem to indicate that the author did not intend the term "student" to apply to young men in any of the existing mining technical schools.

The discussions in general chemistry which have been included to give a foundation for the study of materials and phenomena closely associated with coal mining are good. Statements of fact and theory are each well distinguished and are made in a simple form easily grasped. Among such topics it is necessary only barely to mention such things as physical and chemical changes, laws of chemical action, development of symbols and formulas, physical behavior of gases in general and chemical properties of common elements.

Particular points taken up of interest to mine workers are found in the discussions of sulphur, carbon, coals, flame phenomena, safety lamps, explosives and mine explosions.

The theory and construction of the different forms of safety lamps are given particular consideration, from which the author passes along to the behavior of the flame of a safety lamp in different percentages of various mine gases and how the presence of dangerous gases may be detected by observation of the lamp. The limitations of the use of the safety lamp in gas without danger of explosions are set forth.

In the discussion of coal, the author outlines the accepted theories as to formation and describes the different varieties, making use of a classification into brown, bituminous and anthracite. Bituminous coal he splits up into coking or non-coking coals. Considerable space is devoted to coke and coking processes and to the treatment of by-products of the processes for making coke. To many readers the inclusion of such a long discussion on coke and coke by-products may seem of academic rather than practical interest. In this case it is necessary to rely upon the author's experience that mine workers who are apt to be interested by this book are desirous of knowing what becomes of the coal after it leaves the industry with which they are connected.

One chapter describes the many explosives used in various blasting operations. The whole field of explosives is covered in a very general way, and particular attention is given to outlining the the composition and characteristics of those most frequently used in mining. The author describes some of the common tests which have been used variously to determine the strength, shattering effect and safety of the different explosives. This chapter on the whole seems accurate and comprehensive, with the possible exception of one passage where "dynamite" is defined as consisting of 75% pure "nitro-glycerol" absorbed in 25% of infusorial earth ("kieselguhr"). Many American manufacturers of dynamite would take exception to this statement, since the majority of them seem to regard the use of an inactive "dope," like infusorial earth, alone as obsolete, it having been supplanted by an active "dope" containing combustible or explosive materials—a mixture of wood pulp and sodium nitrate, for instance.

In leading up to the very practical subject of mine explosions, the approach is through a study of the combustion of gas and air mixtures. It is not to be inferred, however, that the author neglects the functions of dust in explosions. Observations after actual explosions are cited and the studies made at the Altofts explosion gallery are summarized to show the reader the influence of coal dust and how it may be counteracted.

Although this text is primarily intended for student workers and is quite elementary, yet for the sake of some of its special chapters it deserves a place in the engineering library of any one interested in either production or use of coals.

DIE EISENBETONPRAXIS.—Ein Leitfaden für Techniker und Architekten. By E. Nicolas, Ingenieur. Wien and Leipzig: A. Hartleben's Verlag. Paper; 6¼ × 9¼ ins.; pp. 317; 301 illustrations in text. 8 marks; American price, $3.20.

A German text-book of reinforced-concrete construction. The customary division of space is followed. The first half of the book deals with the materials of concrete, properties of concrete, theory of structures, and concrete-working machinery and methods. The second half describes and illustrates typical structures, mainly to exhibit the wide application of reinforced concrete and the current forms of design for the different types of structure. While it is now less important than some years ago for American engineers to study the differences between European and American practice by reading the foreign texts, since progress on both sides of the water has tended toward greater similarity both of theoretical views and of types of design, yet there remain many points on which the American designer should take note of European practice. He will find this book useful for this purpose, particularly as concerns recent German practice.

ELEMENTARY PRACTICAL MECHANICS.—By J. M. Jameson, Head of the Department of Physics, School of Science and Technology, Pratt Institute, Brooklyn, N. Y. Second edition. New York and London: Longmans, Green & Co. Cloth; 5 × 7½ ins. pp. 321; 212 illustrations in text. $1.60, net.

Though written rather from the physics teacher's viewpoint than the engineer's, this text of mechanics is a useful book of elementary instruction. It differs from the ordinary text-books of corresponding grade by giving considerable attention to structures of various forms, and to laboratory models of structural and mechanical elements. Designed for use in manual-training and other technical preparatory schools, it is well suited to its purpose. Some elementary matter on stresses and on hydrostatics is added after the chapters on pure mechanics.

ELEMENTS OF MECHANICS.—With Numerous Examples for the Use of Schools and Colleges. By George W. Parker, M. A., Trinity College, Dublin. New York and London: Longmans, Green & Co. Cloth; 5⅛ × 8⅜ ins.; pp. 245; 116 text figures. $1.40, net.

The author's special claim is for simplicity of method, i. e., avoidance of mathematics higher than elementary geometry, algebra and trigonometry. His style also is clear, and the illustrative examples are well varied.

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A British Encyclopedia of Municipal and Sanitary Engineering.

THE ENCYCLOPEDIA OF MUNICIPAL AND SANITARY ENGINEERING.—A Handy Working Guide in All Matters Connected with Municipal and Sanitary Engineering and Administration. Edited by W. H. Maxwell, A. M. Inst. C. E., Borough and Waterworks Engineer, Tunbridge Wells; Past President of the Institute of Sanitary Engineers, etc., and J. T. Brown, M. R. San. Inst., Editor of "The Sanitary Record." New York: D. Van Nostrand Co. Cloth; 7½ x 10 ins.; pp. 561; numerous text illustrations. $10, net.

From the British viewpoint, we presume this may properly be considered as a very satisfactory reference work for municipal and sanitary officials, engineering and otherwise. Its value for use this side of the water will be considerable, and might have been increased had the cooperation of a few Americans been secured in the way of compilation and editing. As it is, although the preface contains a statement that the work includes information gathered from all parts of the world, the book is so essentially British in content and treatment as to make one wonder why the few articles giving information from other countries were included.

The list of contributors contains 37 names, all but one of which, so far as we can judge, are British. The exception is Prof. C.-E. A. Winslow, who contributes an article on "Boston, U. S. A., Sewage Disposal at." This article is about four pages in length. The only other distinctively American article we have been able to find is one of two pages entitled "Ohio Water-Supply and Sewage Disposal." This article is signed "R. W.P.," and as these initials do not correspond to any of the names in the list of contributors, we conclude that the article must have been written by Mr. R. Winthrop Pratt, Chief Engineer of the Ohio State Board of Health. Why Boston among American cities and Ohio among American states should have been singled out for inclusion in this encyclopedia is an interesting question. The answer is made all the more difficult in view of the fact that the investigations of the Massachusetts State Board of Health at the Lawrence Experiment Station do not appear to be given even a mention anywhere in the volume; not even under reports on sewage disposal, where we find both the Baltimore and Columbus reports mentioned. We should add that sewage disposal in the United States is given slight additional consideration, a third of a page being devoted to the "Waring System of Sewage Treatment," or the forced aeration system, experimented with by the late Col. Waring at Newport, R. I., and installed at a few places—not, as the article says, after mentioning Willow Grove Park (Philadelphia) and East Cleveland, Ohio, at "many other places in the United States."

Another general criticism of the work before us applies to the excessive length to which the dictionary plan has been carried. Among many other examples which might be given, we mention only "Aerobic and Anaerobic Treatment (of sewage)" and "Bacteriology of the London Water-Supply." This extensive use of the dictionary plan, of course, has some justification, and it may be forgiven, by those who feel forgiveness necessary, in view of the fact that the leading general articles, like the one on sewage disposal, are quite complete and contain references to the minor articles pertaining to the same subject. It should be noted, however, that a person not familiar with local nomenclature would never think of looking up some of the minor articles under the heads given to them.

Criticism of so extensive a work as this one must, of course, be confined chiefly to general plan and scope unless a notice is carried to great length. We will therefore mention only one or two of the minor points which might otherwise give rise to discussion here. In the brief article on ozone no hint is given of the high cost and general impracticability of this method of water treatment, as thus far developed. In the minor article "Water-Supplies, Odors and Tests in," the possibilities of gaining relief by means of filtration are discussed, but no mention whatever is made of the remarkable success which has been attained by the use of copper sulphate in preventing algae growths and thus preventing tastes and odors. A minor subject which seems to be given altogether disproportionate treatment is "Slate Beds for the Primary Treatment of Sewage." The inordinate length of this article, as compared with those treating subjects of equal importance, may perhaps be justified by considering it as a leading feature, the article having been written by Mr. W. J. Dibden.

We may also note as another minor matter that under "Town Planning" no mention is made of work done in the United States which has attracted the attention and won highly favorable comment from a number of the most eminent of the British town planners. This omission, however, is wholly in keeping with the encyclopedia as a whole, which, as we have already intimated, is limited almost entirely to British ideas and practice.

We have confined our remarks almost wholly to adverse criticism, largely for the sake of indicating some of the ways in which the book, which promises to prove of great value in Great Britain and of no little value in this country, might have been made much more serviceable to Americans. The articles cover a wide range of subjects and, as a whole, seem to be accurate, concise and well written, and the illustrations are well selected and for the most part well reproduced. The large type and open leading give a very pleasing and readable page, and one which in general conforms to the common plan of encyclopedias, but it seems fair to ask whether

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The Work of the Marine or Quarantine Health Officer.

PREVENTION OF INFECTIOUS DISEASES.—By Alvah H. Doty, M. D., Health Officer of the Port of New York. New York and London: D. Appleton & Co. Cloth; 5¼ × 8 ins.; pp. 280. $2.50, net.

Dr. Doty here contributes to the general cause of public health and sanitation some portions of the valuable information and experience in the control of certain infectious diseases which he has gained as Health Officer of the Port of New York. Barring certain considerations which are equally applicable in the control of any and all infectious diseases, the book is essentially one on the prevention of those infectious diseases which are most commonly the subject of grave concern at marine quarantine stations or on board ship between ports.

The book opens with some twenty pages of general observations. These few pages include much sane and eminently sound doctrine which if only generally understood and acted on by health officers, whether marine or municipal, and also by members of the medical profession and the public at large, would greatly aid in placing infectious diseases beyond fear. The burden of this doctrine, and it runs through the whole book, is that infection is to be feared from persons rather than things and therefore that the primary object of the control of infectious diseases is to kill at the earliest possible moment the disease germs in the discharges of the patient. This done, there is comparatively little need for disinfection either of rooms or of room contents which have been used by or associated with persons suffering from infectious diseases. At the same time no hard and-fast rule should be laid down for dealing with the patient, and particularly not for dealing with articles which may have been soiled by discharges from the patient. In other words, sound discretion governed by the special conditions peculiar to each case should be exercised. Here and elsewhere the author renders valuable service in showing how completely the old ideas of fomites and air-borne infection have been swept aside by the revelations of the real means of spreading infectious diseases from man to man, which are confined very largely to direct or relatively direct personal contact.

After the general observations the author proceeds to group the various infectious diseases into three classes, and to discuss general methods of control. He places in the first class smallpox, cholera, plague, typhus fever and yellow fever, which, he says, are "known throughout the world as quarantinable diseases." In the second class he puts diphtheria, scarlatina, measles and varicella, and in the third class, such other infectious diseases as typhoid fever and tuberculosis. The next chapter takes up the problems peculiar to marine sanitation, including such matters as isolation and disinfection on shipboard, the inspection of ships, passengers and crew at landing ports, and the detention in port quarantine of persons suffering from or suspected of having infectious diseases.

A chapter is devoted to each of the diseases named above under class one; that is, smallpox, yellow fever, typhus fever, cholera and plague. These chapters are followed by one on disinfection, another on disinfectants and a third on the application of disinfection to apartments of the sick. The last-named chapter also deals with the isolation and discharge of the patient. A chapter is given to the thermometer as a remarkably efficient aid in the inspection of ship populations at quarantine stations. The final chapter deals with the mosquito, both as an agent in transmitting infectious diseases and as a general nuisance. Here the author outlines briefly the work done under his direction in draining the salt marshes of Staten Island and by this means eliminating the species of mosquito which breeds in salt marshes alone—Culex sollicitans. This particular species of mosquito, it may be added, although breeding in salt marshes only, goes much further from home than other varieties and therefore its elimination is particularly desirable.

The book as a whole is a valuable addition to the literature on health and sanitation. Its readability suffers somewhat from much repetition, but if the book be considered as one chiefly for reference in connection now with one and now with another of the special topics given, this repetition is somewhat advantageous, though we think that point and force would have been given had many of the repetitions been avoided.

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This is considerably more than a trade catalog and falls short of being a professional treatise on landscape gardening. Just what the book is may be better understood after stating that the company of which the author is director or manager, designs plantings, large and small, raises and sells trees, shrubs and various kinds of flowering plants, and does actual work of planting, all on a "three are one" plan. The book explains the plan, outlines various elements of planning and planting, pruning, etc., and gives classified descriptive lists (no prices) of various nursery supplies. The distinctive feature claimed for the book is the "pictorial system," both of landscape effects and of their representation by well-executed half-tone engravings. Many of the views were selected wholly as fitting examples of different planting effects, quite regardless of whether they were wrought by the author's company or by some one else. The text is generally instructive and always vivacious—sometimes too lively or fanciful—but probably the most useful part of the volume is the illustrations, and this is just what the author intended. We venture as a guess that the price placed on the volume is intended chiefly as a stand-off to those who have no just claim to a free copy of an expensive book which, as we have said, is more than a trade catalog and less than a strictly professional treatise on landscape gardening.

GEOLOGY FOR ENGINEERS.—By Lieut.-Col. R. F. Sorsbie, R. E. London: Charles Griffin & Co., Ltd. Philadelphia, Pa.: J. B. Lippincott Co. Cloth; 5¼ × 8 ins.; pp. 423; 94 text illustrations. $3.50, net.

The ambitious intention of including in one medium-sized book all of the principles and applications of geology which may be of value to the engineer is very well fulfilled in this book. It is divided into five parts: Dynamical and Structural Geology, which includes the earth and rock-making agencies; Rocks and Minerals, which takes up the structural character of the various rocks; Historical Geology; Geological Observations, which are explained by their titles, and Practical Geology, which is the real essence of the book to which the former chapters are mainly introductory. In this latter part the subjects are Water-Supply, Building Stones, Bricks and Clays, Limes, Cements and Plasters, Roads and Canals, Rivers and Coast Erosion—all, it will be seen, engineering subjects directly related to the science of geology.

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The author has first of all limited himself to the study of three-phase transmission lines and equipment and on the ground that such systems are most suited to modern requirements so that older single-phase or direct-current systems have been either supplanted or made auxiliary to the three-phase. A further limitation has been voluntarily assumed—that of keeping an elementary treatise. The second limitation necessitates a rather scant and often times an apparently empirical treatment of some point under discussion. The effect of each step in a design on first cost and cost of operation, and vice versa, is considered to such an extent that the treatment becomes essentially an economic discussion of how to transmit electric energy over a three-phase line at the minimum total cost for the immediate present or for as far in the future as it is safe to prophecy concerning the growth of a system. In this way, for instance, the several features of resistance, capacity, inductance, insulation losses, for different voltages are compared to show how choice of the latter is variously influenced.

As the book was written in an English atmosphere, where many features of transmission practice are different from those in America, some topics may seem to be given undue prominence. Thus we can see that underground high-tension transmission may hold out the greatest possibilities of development in England and naturally very many of the author's comments on design apply particularly to the use of sheathed and insulated cables.

A considerable part of the book is given up to descriptions of English switch gear for the control of circuits, and attention is paid to operating phenomena like surges of current, resonant rises of potential, reflected waves of voltage, etc., which are encountered in switching currents onto and off from high-tension transmission lines—especially underground lines.

TREASURY CONSTRUCTION SOCIETY.—Proceedings of the Annual Meeting at St. Louis, Mo., Jan. 27-28, 1911. Burlington, N. C.: Levi R. Whitted, Secy.-Treas. Paper; 6 x 9 ins.; pp. 72.

The Society to which this pamphlet report is devoted is made up chiefly of Superintendents of Construction under the Supervising Architect of the U. S. Department of the Treasury. The report contains a few interesting papers, and considerable discussion on various problems pertaining to the service is indicated. The dominant note of papers and discussions alike is loyalty to the Government and the Department.

DIE VERWALTUNG DER OEFFENTLICHEN ARBEITEN IN PREUSSEN 1900 BIS 1910.—Report to His Majesty the Kaiser and King by the Minister of Public Works. Berlin: Julius Springer. Boards; 7¾ x 11 ins.; pp. 370; 23 illustrations and 42 tables in text; four folding maps in pocket.

This volume reviews briefly the administration of the Prussian Department of Public Works, covering a very extensive railway network, canal and river improvement, harbor construction, shore protection, building work, etc. It is accompanied by maps of the Prussian-Hessian State Railways, navigable waterways in Prussia and adjoining territory, and coastal navigation signals.

Revised topographic maps of the Greenwood Lake and Ramapo quadrangles, New York-New Jersey, have recently been published by the U. S. Geological Survey, in cooperation with the states of New York and New Jersey. The whole state of New Jersey was covered years ago and 225 sheets for New York State have already been issued. Altogether, about 1,900 sheets have been issued by the U. S. Geological Survey, covering over a third of the United States. The single maps are sold at the nominal price of 5 cts. each, or $3 per 100.

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VOLUME TWO

VOLUME TWO, just published, includes a part devoted to a description of local transportation franchises in a large number of American cities. The utilities considered are street railways, elevated railroads, subways, interurban railways, bridges, viaducts, toll roads, depots, belt line railroads, spur tracks, docks, markets, ferries and omnibus lines.

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